

CLAIMS

1. A side plate for use in heat exchangers comprising a pair of headers arranged as spaced apart from each other, a plurality of flat heat exchange tubes arranged in parallel as spaced apart from one another between the headers and each having opposite ends joined to the respective headers, the side plate disposed externally of and at a distance from the flat heat exchange tube at each of opposite ends of the tube arrangement, and corrugated fins arranged between adjacent heat exchange tubes and between the side plate and the end exchange tube adjacent thereto,

the side plate for use in heat exchangers being provided with a projection at each of opposite end portions of a surface thereof opposite to the other surface in contact with the corrugated fin.

2. A side plate for use in heat exchangers according to claim 1 wherein the projection is positioned at a distance of up to 135 mm from the header when the side plate is incorporated into the heat exchanger.

3. A side plate for use in heat exchangers according to claim 1 wherein at least two projections are provided as spaced apart widthwise of the side plate at each end portion.

4. A side plate for use in heat exchangers according to claim 1 wherein the projection is 0.3 to 1 mm in height.

5. A side plate for use in heat exchangers according to claim 1 wherein the projection is circular and 1 to 4 mm in diameter.

6. A side plate for use in heat exchangers according to

claim 1 wherein a second projection is formed at a distance from the projection at each end portion and positioned inwardly of the projection with respect to the longitudinal direction of the side plate.

5 7. A side plate for use in heat exchangers according to claim 6 wherein the second projection is at a distance of up to 30 mm from the projection at each end portion.

10 8. A side plate for use in heat exchangers according to claim 6 wherein at least two second projections are provided as spaced apart widthwise of the side plate at each end portion.

9. A side plate for use in heat exchangers according to claim 6 wherein the second projection is 0.3 to 1 mm in height.

15 10. A side plate for use in heat exchangers according to claim 6 wherein the second projection is circular and 1 to 4 mm in diameter.

11. A heat exchanger comprising a pair of headers arranged as spaced apart from each other, a plurality of flat heat exchange tubes arranged in parallel as spaced apart from one another between the headers and each having opposite ends joined to the respective headers, a side plate disposed externally of and at a distance from the flat heat exchange tube at each of opposite ends of the tube arrangement, and corrugated fins arranged between adjacent heat exchange tubes and between the side plate and the end exchange tube adjacent thereto, 20 the side plate being one according to any one of claims 1 to 10.

25 12. A refrigeration cycle comprising a compressor, a condenser and an evaporator, the condenser comprising a heat

exchanger according to claim 11.

13. A refrigeration cycle comprising a compressor, a condenser and an evaporator, the evaporator comprising a heat exchanger according to claim 11.

5 14. A vehicle having installed therein a refrigeration cycle according to claim 12 or 13 as an air conditioner.

15. A process for fabricating a heat exchanger according to claim 11 which includes:

arranging a plurality of flat heat exchange tubes in parallel
10 as spaced from one another, disposing a side plate according to any one of claims 1 to 10 externally of and at a distance from the flat heat exchange tube at each of opposite ends of the tube arrangement with the projections facing outward and arranging corrugated fins between adjacent heat exchange tubes
15 and between the side plate and the end exchange tube adjacent thereto,

placing opposite ends of the heat exchange tubes into respective corresponding insertion holes formed in a pair of headers,

arranging a pressure plate having a length greater than the
20 distance between the projections at the opposite end portions of the side plate, on each of the side plates externally thereof in contact with the projections at the opposite end portions,

binding the pressure members, the side plates, the heat exchange tubes and the corrugated fins together with fastening
25 members on widthwise opposite sides of the side plates, and brazing the headers to the heat exchange tubes, and the corrugated fins to adjacent heat exchange tubes and to the side plates.

16. A process for fabricating a heat exchanger according to claim 15 wherein the side plate used is one according to any one of claims 6 to 10, and the components are bound with the fastening members at locations closer to the respective 5 headers than the projections at the respective end portions, and at locations inwardly of the respective second projections with respect to the longitudinal direction of the side plate.